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ABSTRACT

The purpose of this research study is to look at the effectiveness of the Remedial Math Program at the University of Montana (UM) for Native American students in preparing them for entry into regular college math sequences. The sample consisted of all (1,110, of whom 77 were Native Americans students) enrolled in UM Basic Skills course (Math 001/100) during the 1979-80 academic year. Analysis of the 1979-80 basic skills mathematics students showed that Native American "remedial" students were more likely to have had fewer high school math courses and such courses tended to have been of lower level math and taken less recently; both non-Native Americans and Native American basic skills students were most often business administration majors, followed by undecided and arts and sciences majors; and both groups shared similiar profiles in regard to official class rank (over 70% were freshmen). In regard to college math experience, Native Americans obtained lower placement scores, more often reported prior enrollment in "remedial" math programs, and showed a significantly higher percentage who began at the lower Math 001. Beyond organizational and structural improvements, special support services had a positive impact on the Native American student performance. (ERB)

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NATIVE AMERICAN STUDENTS IN BASIC SKILLS MATHEMATICS AT THE UNIVERSITY OF MONTANA

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NATIVE AMERICAN STUDENTS
IN
BASIC SKILLS MATHEMATICS
AT THE
UNIVERSITY OF MONTANA

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August 1982

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I. INTRODUCTION AND PURPOSE OF THE STUDY

In the past several years increasing numbers of students have entered the nation's colleges and universities with inadequate preparation to begin regular mathematics sequences required or recommended for their degree programs. This trend is in part due to the overall decline of secondary math performance and to the establishment of mathematics requirements for graduation in many higher educational institutions and programs. Increasingly, however, it is also the result of attracting a greater number of students who traditionally have not attended institutions of higher education. These non-traditional students are more likely to be older, female and/or from an ethnic minority. In any case, along with expanding recruitment and retention activities, such pressures have resulted in a greater need for effective basic skills instruction (frequently referred to as "remedial") programs in mathematics, particularly in the four-year colleges and universities where degree programs are attempting to provide access to all potential students [13,14].

The University of Montana (UM) is no exception to these trends and pressures for providing basic skills (pre-college) mathematics, where in the past ten years there has been a small (4.6%) decrease in the student population but a 594 percent increase in the remedial math program [2]. The largest ethnic minority at the University of Montana consists of approximately 200 Native Americans from over thirty different tribes. They most often represent Montana's seven reservations but many come from reservations in the surrounding region as well as other parts of the United States and Canada.

A series of national and tribal studies of Native American educational

attainment and literacy conducted recently has clearly demonstrated the exceptional need for remedial mathematics among Native Americans entering colleges, as in many tribes the average math achievement of graduating high school seniors is that of a ninth grader or less [3-12, 15]. An earlier study of Native American students enrolled in UM remedial mathematics showed that in 1976-77, prior to the time when any specialized remedial program efforts were directed toward Native Americans, only 2 (5.7%) of the 35 Native American students did succeed in passing Intermediate Algebra [1].

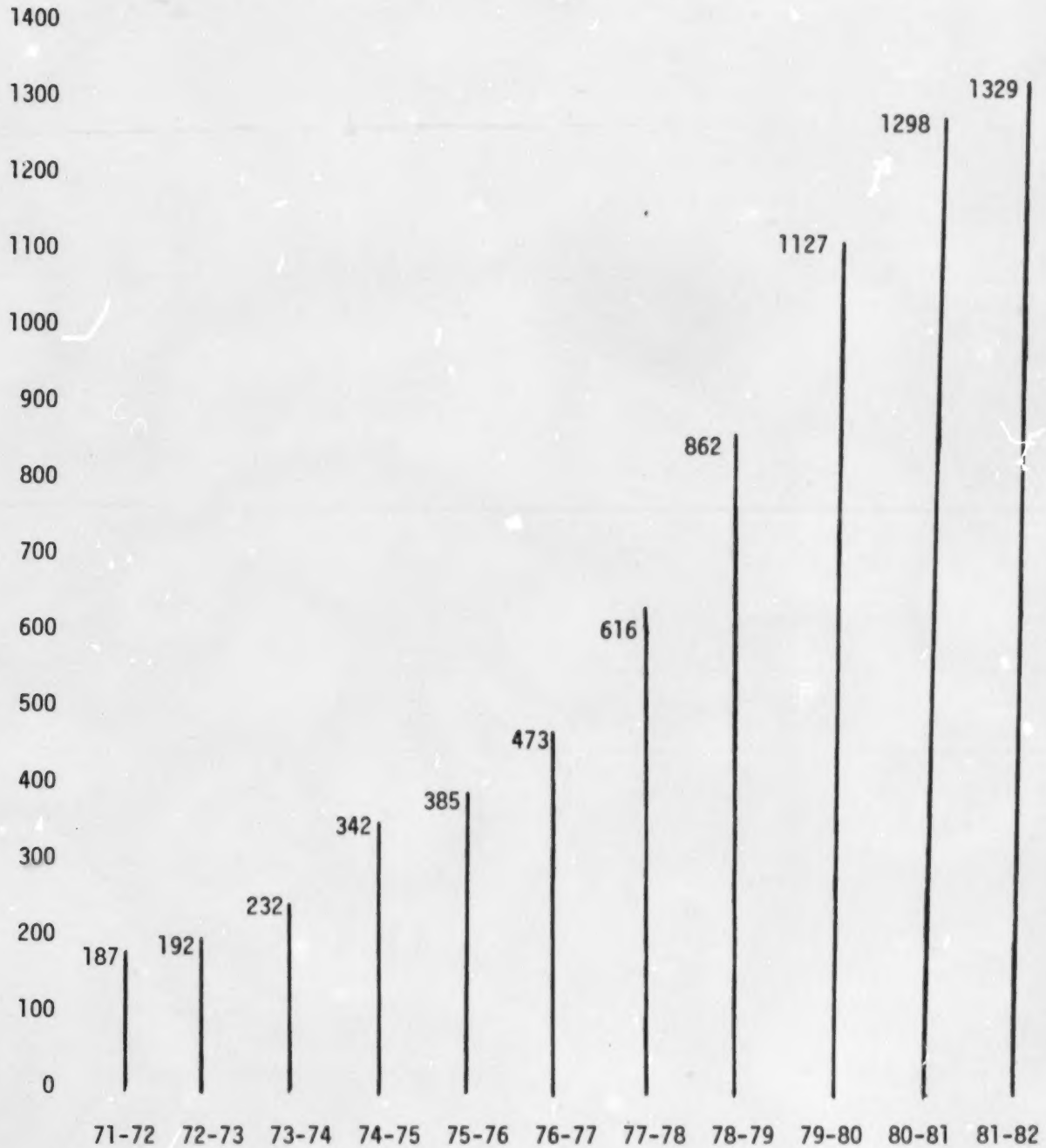
Basic Skills Mathematics at UM

Early attempts to offer basic skills math instruction at the University of Montana go back over a decade. Figure 1 shows that by 1971-72 there were 187 students enrolled in the non-credit Intermediate Algebra (called Math 001). Remedial math enrollments steadily increased during the next few years through 1976-77 when 473 Math 001 students continued to take Intermediate Algebra on a pass/fail basis. Starting in 1977-78, however, three levels of basic skills mathematics have been offered: Arithmetic, Introductory Algebra, and Intermediate Algebra. The total enrollment for each of these levels has increased every year since then, especially in Intermediate Algebra which has more than tripled in size since 1977-78 [2]. The total enrollment for the three levels combined has recently more than doubled from 616 in 1977-78 to 1329 in 1981-82.

Even though the course content for Intermediate Algebra (using the Keedy-Bittinger Worktext) has changed little since 1976-77, the structure of UM's remedial math program has evolved in several ways. In 1976-77, only the Intermediate Algebra level was offered as Math 001 for 5 registration credits which did not count toward graduation. The method of instruction was the audio-tutorial approach which consisted of self-study from assignments

FIGURE 1

TOTAL MATH 001/100 ENROLLMENT* 1971-72 THROUGH 1981-82**



* Figures include W (withdraw) and L (listener) listed on final grade sheets
** 1978-79 to present include summer session enrollment

on the course syllabus and providing a math lab (available daily from 8:00 a.m. to 5:00 p.m.). In the lab, students could use "canned lectures" on cassette tapes in conjunction with the text, ask questions of the lab assistant on duty (a T.A. or work-study student), and take the required exams on demand. Any exam receiving a grade of "D" of "F" would need to be repeated until mastered with a grade of "C" or better. Successful completion of the course meant receiving a grade of "C" or above on each of the unit exams and the comprehensive final. With an overall low course completion rate of 19.5% (only 5.7% for Native American students), clearly some major problems existed in the program: insufficient staffing resulted in little, if any, student-instructor contact and many students were simply not prepared to begin at the Intermediate Algebra level [1].

Two major program changes were implemented in 1977-78. First of all, three levels of basic skills instruction were offered within the non-credit Math 001 course: Arithmetic, Introductory Algebra, and Intermediate Algebra (using the Keedy-Bittinger Worktext sequence). Students were assigned to one of the three levels on the basis of the results of a remedial placement exam given the first day of class. Also, two part-time instructors were hired to give lectures twice weekly in coordination with the course syllabus for each of the algebra levels. One of these instructors, partly funded by the Indian Careers in Health Program, offered special Math 001 orientation sessions for Native American students enrolled in the program and established communication linkages with the Native American Studies Advisor/Counselor which included bi-weekly reports that monitored the progress of each Native American student. Even though lectures were offered, the lab was still used for all testing (exams were not returned) and instructors as well as lab assistants were available during the week to answer questions and offer encouragement to

students. Overall completion rates more than doubled with these structural changes [2].

During the next academic year, 1978-79, Arithmetic and Introductory Algebra remained as levels of the non-credit Math 001 (pass/fail) with slight increases in enrollments. All testing was done in the lab with lectures available to students twice a week in Introductory Algebra and once a week in Arithmetic. The biggest change in the program, however, came as a result of offering Intermediate Algebra as Math 100, a regular five credit course (credits were allowed toward graduation but not as substitutes for any math requirements), with lectures being increased to three hours per week. Each initial Math 100 unit exam was given in the classroom with grades posted the next day and retake exams (for a maximum grade of "B") continued to be given in the math lab (with two possible retakes allowed for each unit exam). Most Math 100 students took the course for the letter grade option and the overall completion rate increased dramatically (i.e., over three-fourths of the students successfully completed Math 100 with this structure). In addition, the total annual enrollment in Intermediate Algebra more than doubled from the previous year [2].

The format for the Math 001 levels remained about the same for 1979-80; however, some additional changes were made in Math 100. The initial Intermediate Algebra unit exams given in class were returned to students the next class period (rather than only posting the exam grades) and the guidelines for retaking unit exams became more firm (a maximum grade of "C" was allowed on retakes or late exams and only one retake for each unit exam was permitted which had to be taken within a week of the initial exam). Completion rates remained stable, but enrollments in all levels (especially in Intermediate Algebra) continued to increase from 862 to 1,127 students. This was the first year that a full-time coordinator-instructor was hired but limited resources

to staff this rapidly growing program caused some serious problems in program planning and implementation; i.e., last minute, quarter-by-quarter funding created difficulties in registering students and hiring instructors to teach additional sections of Math 100. The math lab, itself inadequate, was also understaffed making it very difficult to handle the increasing student demand.

Enrollments continued to increase in each of the three levels during the 1980-81 academic year. To relieve some of the pressure on the math lab and for the convenience of the students, lab hours were increased to include evening hours during the week (Monday-Thursday 8:00 a.m. to 9:00 p.m. and Friday 8:00 a.m. to 5:00 p.m.). Also, during the peak usage hours in the middle of the day, two lab assistants were on duty. A training workshop for all Math 001/100 lab assistants and instructors was offered and focused on the subject of math anxiety in students. In an attempt to help motivate Introductory Algebra students to keep pace with the course syllabus each initial exam was also given in class on scheduled dates and returned the next class period, with retakes given in the lab. In Math 100 the cutoff places on the grading scale were raised a little (i.e. 68-80 became the range for "C" rather than 65-79). Also, a new format for tests consisted of multiple choice items as well as several problems to work out in greater detail (a large exam item file was created to enable instructors to randomly select items in making up multiple forms of exams with this format). There was a noticeable improvement in the completion rates for Introductory Algebra while the pass rates were slightly lower for Arithmetic and Intermediate Algebra. However, the overall completion rate remained stable [2]. Increased demand and lack of stable resources continued to be problematic; while approximately 60 percent of the Math 001/100 coordinator/instructor salary was funded by a Special Services grant, the rest of the program continued

to be financed by last minute, piecemeal funding of part-time instructors, T.A.'s and lab assistants (work/study and non-work/study students).

Few structural program changes occurred during 1981-82. Some of the lab procedures were refined and another training workshop for staff was offered. There was a near-crisis, however, with problems in the usual last-minute funding of the instructional staff and lab assistants. Even with Special Services continuing its contribution and with some University resources finally being released, there were hundreds of students turned away from Math 100 sections Autumn and Winter quarters. In spite of losing students (some were picked up Spring quarter) enrollments in each level increased slightly, with the combined total Math 001/100 enrollment going from 1,298 to 1,329.

In summary, there have been dramatic enrollment increases in remedial math courses at UM (nearly 600% over the last ten year period). While the course content has remained stable during the past five years, major structural and organizational changes have been implemented to accommodate the increased student demand and improve the completion rates, while attempts also have been made to stabilize the program and plan for future needs.

Purpose of the Study

While the Remedial Math Program in its recent form (1979-80) has been shown to be effective in preparing students for entry into the regular college math sequences [2], the purpose of this research is to look at the effectiveness of this process for Native American students relative to that demonstrated for remedial students in general. Although Native American students comprise the largest ethnic group in the state (approximately 4.7 percent in Montana), they comprise only about 2.3 percent of the Fall 1981 UM student population.

Native Americans have comprised 6.4 percent of those enrolled in the Math 001/100 program over the past six years (1976-77 through 1981-82), but this figure has varied somewhat over time from a low of 5.3 percent in 1978-79 and 1980-81 to a high of 10.8 percent in 1977-78 (see Table 1). Thus, besides being under-represented in the University, Native American students also appear to have the poorest math backgrounds prior to entering college and, therefore, have the greatest need for a basic skills math program which is both responsive to their needs and results in improved access to college degrees and programs now requiring or recommending regular math sequences.

TABLE 1

NATIVE AMERICANS AS A PERCENT OF
STUDENTS ENROLLED IN REMEDIAL MATH
1976-77 THROUGH 1981-82

Year	% Native American
1976-77	8.1
1977-78	10.8
1978-79	5.3
1979-80	6.5
1980-81	5.3
1981-82	5.4
6-year average	6.4

Sample and Study Design

The sample consists of all (1,110) students enrolled in UM Basic Skills courses: Math 001 (College Arithmetic), Math 001 (Introductory Algebra), or Math 100 (Intermediate Algebra) during the 1979-80 academic year, not including summer session (note: Students may be included more than once in the sample if more than one remedial course was taken). Placement score data, however, were recorded only once for the initial quarter of enrollment. The sample includes 77 Native American students as well as 1033 of their peers enrolled in the Remedial Math Program. This provides the comparative data

necessary to answer some of the questions raised regarding the relative effectiveness of the Remedial Math Program for Native American students at UM.

Most of the demographic and high school math experience data were obtained from self-reported information forms collected from each student during the first week of each quarter in Remedial Math (See Appendix A). Placement scores on file in the Math Department were available for those individuals taking the Math Placement Exam. Data such as final course grade, official class standing and declared major were obtained from official class rolls and final grade reports. Also, follow-up data on subsequent math courses taken were obtained by linking up each student originally enrolled in Autumn and Winter Quarter with his/her next quarter's math course (i.e. Math 100, 104, 107) and final grade (See explanation of coding sheet in Appendix B).

II. GENERAL CHARACTERISTICS OF THE BASIC SKILLS MATH PARTICIPANTS

General information available from the 1,110 students in the 1979-80 Remedial Math Program consists of demographic characteristics, high school math experience, college math experience and remedial math performance.

Demographic Characteristics

Although not statistically significant, results show that Native American students in the University of Montana 1979-80 Math 001/100 Program are somewhat more likely to be female (53.2%) than are their classmates (47.4%). Table 2 indicates that Native Americans also tend to be significantly older than other program participants; i.e., less recently graduated from high school.

Perhaps related to this finding, Table 3 shows that Native American participants are less likely to live in University dorms; this is not surprising since, being older, they are more likely to have established families which

TABLE 2

YEAR GRADUATED FROM HIGH SCHOOL
REMEDIAL MATH STUDENTS, 1979-80

Year	Non-Native	Native	Total
1976-80	614 (70.9%)	28 (58.3%)	642 (70%)
1971-75	161 (18.6%)	8 (16.7%)	169 (18%)
1966-70	55 (6.4%)	7 (14.6%)	62 (7%)
1961-65	18 (2.1%)	5 (10.4%)	23 (3%)
Before 1960	18 (2.1%)	0 (0.0%)	18 (2%)
Total	866	48	914

would tend to preclude them from residing in dorms. Native American Math 001/100 students, however, are less likely to report having a phone (72.2%) than are their classmates (91.4%).

TABLE 3

CURRENT RESIDENCE OF
REMEDIAL MATH STUDENTS, 1979-80

Location	Non-Native	Native	Total
Dormitory	427 (46.0%)	15 (27.8%)	442 (45.0%)
City	468 (50.4%)	37 (68.5%)	505 (51.4%)
Non-city	34 (3.7%)	2 (3.7%)	36 (3.7%)
Total	929	54	983

If being older and more established, living off campus and being less likely to have a phone are found to be factors which mitigate against successful Math 001/100 performance (i.e., inconvenience with respect to lab facilities, communication with lab assistants, instructors, etc.), then Native American remedial math students as a group tend, more than do their classmates, to be at a disadvantage with respect to these as well as other academically related dimensions. Some support for this notion is found in the fact that all but one (i.e., 98.7%) of the Native Americans participating in the 1979-80 Math 001/100 program were listed as Special Services students, whereas only 13.1 percent of their peers were so classified.

Except for the fact that none of the Native American Math 001/100 participants are classified as graduate students (2.0 percent of the other 001/100 students are officially classified as graduate students), there are no differences between the two groups with respect to official class rank. That is, about three fourths (73.3%) of the Math 001/100 students are freshmen, about 14 percent are sophomores, 7.4 percent are juniors and a few (3%) are seniors.

As reported earlier [2], the officially declared major of most Math 001/100 participants is Business Administration (30.3%), followed by "General" (25.8%) and then majors within the College of Arts and Sciences (15.9%). Table 4 indicates that Native American Math 001/100 students also follow this pattern, but are especially more likely than are other students to be majoring in the Social Sciences (18.2%, compared to only 8.5%) and Pharmacy (10.4% compared to 6.0%). This latter finding appears to be the residual effects of Indian Careers in Health Program which received its last federal funding through the School of Pharmacy in 1977-78.

TABLE 4

DECLARED MAJOR OF
REMEDIAL MATH STUDENTS, 1979-80

Major	Non-Native	Native	Total
Non-degree	59 (5.7%)	1 (1.3%)	60 (5.4%)
General	265 (25.7%)	21 (27.3%)	286 (25.8%)
Arts & Sciences	161 (15.6%)	15 (19.5%)	176 (15.9%)
Social Sci.	88 (8.5%)	14 (18.2%)	102 (9.2%)
Physical Sci.	38 (3.7%)	1 (1.3%)	39 (3.5%)
Life Sciences	15 (1.5%)	0 (0.0%)	15 (1.4%)
Humanities	20 (1.9%)	0 (0.0%)	20 (1.8%)
Bus. Admin.	310 (30.0%)	26 (33.8%)	336 (30.3%)
Education	42 (4.1%)	4 (5.2%)	46 (4.1%)
Fine Arts	22 (2.1%)	0 (0.0%)	22 (2.0%)
Forestry	73 (7.1%)	2 (2.6%)	75 (6.8%)
Journalism	21 (2.0%)	0 (0.0%)	21 (1.9%)
Pharmacy	62 (6.0%)	8 (10.4%)	70 (6.3%)
Graduate	17 (1.6%)	0 (0.0%)	17 (1.5%)
TOTAL	1032	77	1109

High School Math Experience

Previous experience in mathematics should be an important factor in assessing current math level and success. Table 5 shows that Native American remedial students (18.0%) are much more likely than other Math 001/100 students (8.6%) to have taken only one high school math course.

TABLE 5

YEARS OF HIGH SCHOOL MATH OF REMEDIAL MATH STUDENTS, 1979-80

Year	Non-Native	Native	Total
None	13 (1.4%)	0 (0.0%)	13 (1.4%)
1-1.9	78 (8.6%)	9 (18.0%)	87 (9.1%)
2-2.9	475 (52.4%)	23 (46.0%)	498 (52.0%)
3-3.9	261 (28.8%)	14 (28.0%)	275 (28.7%)
4	80 (8.8%)	4 (8.0%)	84 (8.8%)
TOTAL	907	50	957

Native American 001/100 students also differ significantly from their classmates in regard to the specific math courses taken in high school. Table 6 indicates that Native Americans are much more likely than other remedial students to have taken some kind of "general" or "consumer" math in high school, and consequently are less likely to indicate having taken higher level math courses (i.e., Algebra I, Geometry, Algebra II and Senior Math).

TABLE 6

PERCENT OF REMEDIAL MATH STUDENTS WHO TOOK PARTICULAR HIGH SCHOOL MATH COURSE

H.S. Course	Non-Native	Native	Total
General Math	38.7	74.0	40.6
Algebra I	90.0	76.0	89.2
Geometry	63.7	24.0	61.6
Algebra II	29.8	14.0	29.0
Sr. Math/Calc.	3.8	0.0	3.6
Computer Math	0.7	2.0	0.7

In part this pattern may be a reflection of the fact that Native American 001/100 students tend to have been away from their high school math experience longer than have their classmates (see Table 7). That is, Native American 001/100 students are less likely than others to have had their last math course within the past five years (i.e., two-thirds compared to three-fourths have had math in the last five years). Perhaps a reflection of attending high school when (and where) little, if any high school math was expected, this problem becomes another burden to overcome, particularly for the Native American student.

TABLE 7

YEARS SINCE LAST MATH COURSE FOR REMEDIAL MATH STUDENTS, 1979-80

# of Years	Non-Native	Native	Total
0-4	695 (74.9%)	36 (66.7%)	731 (74.4%)
5-9	148 (15.9%)	10 (18.5%)	158 (16.1%)
10-14	55 (5.9%)	7 (13.0%)	62 (6.3%)
15-39	30 (3.2%)	1 (1.9%)	31 (3.2%)
TOTAL	928	54	982

In summary, compared to their Math 001/100 classmates, Native American students tend to have had fewer high school math courses and such courses tend to have been of lower level (e.g., general or consumer) math and taken less recently. All of these factors may impact college math level and performance.

College Math Experience

Math placement scores were obtained from only 341 Math 001/100 students [2]; however, comparing Native Americans with their peers is instructive. Not surprisingly, Table 8 shows that Native Americans tend to obtain lower placement scores than do other remedial students.

TABLE 8

MATH PLACEMENT SCORE OF
REMEDIAL MATH STUDENTS, 1979-80

Math Score	Non-Native	Native	Total
25-27	2 (0.6%)	0 (0.0%)	2 (0.6%)
17-24	100 (30.8%)	3 (18.8%)	103 (30.2%)
9-16	194 (59.7%)	10 (62.5%)	204 (59.8%)
1-8	29 (8.9%)	3 (18.8%)	32 (9.4%)
TOTAL	325	16	341

Native American students also more often report having enrolled in the Math 001/100 program before (35.3% while only 21.7% of the other students report prior enrollment). With regard to math plans in college, 92.2 percent of both groups plan to take more mathematics. Of those 735 who specify which math course they later plan to take, clearly most are expecting to

enroll in the Math 104-5-6 sequence--"Math for the Social Sciences," with Native American students being more inclined than their peers towards the Math 107-8-9 sequence--"Math for the Biological Sciences" and Math 001/100 (see Table 9).

TABLE 9

COLLEGE MATH COURSES PLANNED BY REMEDIAL MATH STUDENTS, 1979-80

Math Course	Non-Native	Native	Total
001/100	83 (12.0%)	7 (17.1%)	90 (12.2%)
104-106	430 (62.0%)	23 (56.1%)	453 (61.6%)
107-108	121 (17.4%)	11 (26.8%)	132 (18.0%)
121	40 (5.8%)	0 (0.0%)	40 (5.4%)
Other	20 (2.9%)	0 (0.0%)	20 (2.7%)
TOTAL	694	41	735

The latter finding is explained in part by the fact that a significantly higher percentage of Native American remedial students begin at the Math 001--Arithmetic and Introductory Algebra levels compared to other remedial students (see Table 10). That is, two-thirds of the non-Native students are already in Math 100 (Intermediate Algebra), whereas only 27 percent of the Native American remedial students have achieved that level; therefore, Native Americans are more likely than are other remedial students to plan on Math 100 as their future math course.

TABLE 10

CURRENT REMEDIAL MATH COURSE, 1979-80

Remedial Course	Non-Native	Native	Total
Arithmetic Math 001	51 (4.9%)	18 (23.4%)	69 (6.2%)
Introductory Algebra--001	283 (27.4%)	38 (49.4%)	321 (28.9%)
Intermediate Algebra--100	699 (67.7%)	21 (27.3%)	720 (64.9%)
TOTAL	1033	77	1110

Course Level Performance Comparisons

The summary of 1979-80 final grades assigned for each of the three remedial math levels in Table 11 clearly shows that there is a much higher pass rate in the 5 credit Intermediate Algebra course for both Native American (67%) and non-Native (71%) students than in the lower Math 001 level courses. That is, the pass rate was low for both groups in Introductory Algebra--26% for Native American students and 39% for non-Native students (the totals in these figures include withdrawals) and was especially low for the Native Americans in Arithmetic (22%) compared to other students (69%). This pattern of pass rates for both Native American and other remedial students tending to be higher for Math 100 than for the lower level 001 courses in part appears to reflect the fact that credits toward graduation are given only for Math 100 and not for the two levels of Math 001.

A further observation is that in each of the three remedial math levels during this particular year, the percentage of students passing is lower for

TABLE 11

FINAL GRADE COMPARISONS BY COURSE LEVEL, 1979-80

Intermediate Algebra

Grade	Non-Native	Native	Combined
A-C, P	495 (71%)	14 (67%)	509 (71%)
D	58 (8%)	0 (0%)	58 (8%)
F, X	78 (11%)	2 (10%)	80 (11%)
I(F), I(X)	23 (3%)	2 (10%)	25 (3%)
W	40 (6%)	3 (14%)	43 (6%)
Non-missing	694 (100%)	21 (100%)	715 (100%)
Missing	5	0	5
TOTALS	699	21	720

Introductory Algebra

P	109 (39%)	10 (26%)	119 (37%)
X	136 (48%)	21 (55%)	157 (49%)
I(X)	23 (8%)	2 (5%)	25 (8%)
W	13 (5%)	5 (13%)	18 (6%)
Non-missing	281 (100%)	38 (100%)	319 (100%)
Missing	2	0	2
TOTALS	283	38	321

Arithmetic

N	35 (69%)	4 (22%)	39 (57%)
X	13 (25%)	13 (72%)	26 (38%)
I(X)	1 (2%)	0 (0%)	1 (1%)
W	2 (4%)	1 (6%)	3 (4%)
TOTALS	51 (100%)	18 (100%)	69 (100%)

Native Americans than for their non-Native peers. This discrepancy, however, is the greatest at the lowest 001 levels (perhaps reflecting their initial poorer math preparation) and tends to be reduced to non-significance by the time they reach the highest remedial math (100) level. To further analyze these ideas, trend data are examined in Chapter IV to determine what has happened over time to the discrepancy in pass rates between Native Americans and their peers and the following chapter looks at how well each group performs in subsequent math courses after completing this particular remedial math course.

III. PERFORMANCE IN SUBSEQUENT MATH COURSES

Previous research [2] has shown that, in general, University of Montana students taking remedial math tend to perform better in subsequent math courses (Math 104, 107) than do students not taking remedial math the previous quarter. To determine the relative effectiveness of the remedial math program in successfully preparing Native American students, compared with their classmates, math courses and grades were obtained from Native and non-Native students enrolled in Math 001/100 (Autumn 1979 or Winter 1980) who took a higher level math course during a subsequent quarter (either Winter or Spring 1980). These subsequent performances were also compared to those of non-remedial students enrolled in the same courses.

Subsequent Math Course

Looking at the 874 remedial students in Fall and Winter Quarters, 304 (37.3%) of the non-Native and 22 (37.9%) of the Native American students took a subsequent math course during the remaining academic year (1979-80). Dramatic differences between these two groups show up, however, in the types of subsequent courses taken (see Table 12). The subsequent coursework for

most (63.8%) of the non-Native students takes them into the math sequences beyond the remedial level; i.e., Math for the Social Sciences--104 (43.4%), the Biological Sciences--107 (10.9%) or Math 121 (8.2%). Some (27%) take Intermediate Algebra (Math 100) and a few take Math 001, both of which are part of the remedial program. In contrast, Native American students as a group demonstrate their greater need for remedial work as over three-fourths (77.3%) of them choose subsequent math courses at the remedial levels of Math 001 (45.5%) or Math 100 (31.8%). This, of course, reflects the fact discussed earlier that Native American students tend more than their Math 001/100 classmates to begin their college math at lower levels of remedial instruction.

TABLE 12

NEXT QUARTER'S MATH COURSE FOR REMEDIAL MATH STUDENTS, 1979-80

Course	Non-Native	Native	Total
Math 001	28 (9.2%)	10 (45.5%)	38 (11.7%)
Math 100	82 (27.0%)	7 (31.8%)	89 (27.3%)
Math 104	132 (43.4%)	4 (18.2%)	136 (41.7%)
Math 107	33 (10.9%)	1 (4.5%)	34 (10.4%)
Math 121	25 (8.2%)	0 (0.0%)	25 (7.7%)
Other	4 (1.3%)	0 (0.0%)	4 (1.2%)
TOTAL	304	22	326

Subsequent Math Grade

While Native Americans tend to start at lower levels of instruction

in the remedial program and are, therefore, less likely subsequently to take advanced math, they and their non-Native remedial peers tend to do as well or better in their subsequent math courses than do students without prior remedial instruction (see Table 13).

TABLE 13

PERFORMANCE IN SUBSEQUENT MATH COURSE

Intermediate Algebra--Math 100

Grade	Remedial Math 001 Prior Quarter Non-Native	Native	No Remedial Math Prior Quarter
Pass	60 (73.2%)	5 (71.4%)	223 (67.8%)
D	5 (6.1%)	0 (0.0%)	28 (8.5%)
Fail	11 (13.4%)	0 (0.0%)	47 (14.3%)
I	2 (2.4%)	1 (14.3%)	11 (3.3%)
W	4 (4.9%)	1 (14.3%)	20 (6.1%)
SUBTOTAL	82	7	329

Math 104 or 107

Grade	Remedial Math 100 Prior Quarter Non-Native	Native	No Remedial Math Prior Quarter
Pass	111 (67.3%)	3 (60.0%)	200 (61.3%)
D	29 (17.6%)	1 (20.0%)	36 (11.0%)
Fail	11 (6.7%)	1 (20.0%)	60 (18.4%)
I	8 (4.8%)	0 (0.0%)	11 (3.4%)
W	6 (3.6%)	0 (0.0%)	19 (5.8%)
SUBTOTAL	165	5	326

Both non-Native (73%) and Native American (71%) students taking remedial Math 001 instruction just prior to taking Math 100 are more likely to pass than are students who do not take such prior remedial instruction (68% pass). Also, those remedial students, both Native Americans (60%) and non-Natives (67%) taking regular math sequence courses (Math 104 or 107) just after their remedial instruction, do about as well or better than do regular students attending those same sequence courses (i.e., about 61 percent of the students without prior remedial instruction are able to pass the initial math sequence courses). While generalizations here are based on a relatively small number of cases, particularly with respect to Native Americans, the results suggest that, once having completed remedial math instruction prior to taking their subsequent math courses, both Native American and non-Native students with initially low math skills tend to perform as well or better than do regular students in those same subsequent courses but who do not need or take prior remedial work.

Previous research [2] has also shown that in the next subsequent regular math sequence courses (Math 105 and 108), remedial students (92%) are much more likely to pass than are regular (non-remedial) students (78% pass). The small number of Native American cases prevents testing this particular result for their subgroup. In any case, however, Native Americans taking Math 100 (preceded by Math 001 the previous quarter) in 1979-80, show a significantly improved pass rate over that achieved prior to the current remedial program, and they compete well with other students in their subsequent Math 104 or 107 sequence.

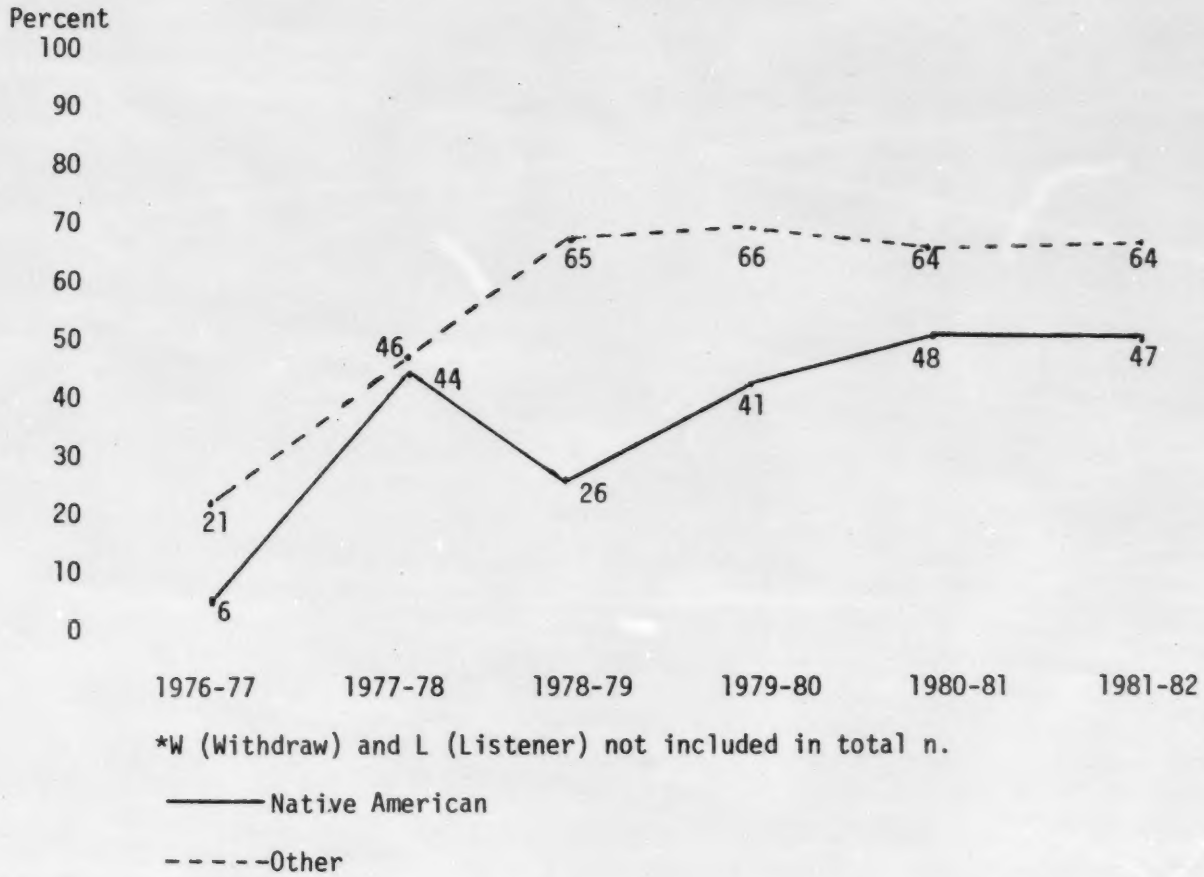
IV. BASIC SKILLS MATH PERFORMANCE TRENDS

Comparative data for pass rates in basic skills math instruction (three

levels combined) for the past six years are summarized in Figure 2. In looking at the trends, the percentage of Native American students passing (i.e., receiving a grade of "P", "N", "A", "B", or "C") is compared to that of non-Native students in the same classes from 1976-77 through 1981-82 (withdrawals and listeners are not included in the totals for computing percentages). More detailed breakdowns for each year are found in tables C-1--C-6 in Appendix C.

FIGURE 2

PERCENT PASSING (WITH "C" OR BETTER)* MATH 001/100
FROM 1976-77 THROUGH 1980-81



*W (Withdraw) and L (Listener) not included in total n.

———Native American

- - - - -Other

Clearly in 1976-77 the pass rate was low for both groups--21% for the non-Native students and only about 6% for the Native American students (see Table 1 in Appendix C). It should be recalled that only Intermediate Algebra was offered as the non-credit Math 001 that year and there were no specialized efforts to orient and assist Native American students.

With the program changes implemented in 1977-78 (three levels of remedial math and instructors offering lectures in the Algebra courses), completion rates improved dramatically for both groups, particularly for the Native American students who apparently responded well to the revised structure as well as to the cooperative monitoring efforts between the Native American Studies Counselor/Advisor and remedial math instructors. Table 2 in Appendix C reveals that the pass rate was even higher for Native American students in Intermediate Algebra (56% vs. 53% for other students) and in Arithmetic (86% vs. 43%), but was lower in the Introductory Algebra level (23% vs. 45%). Combining the three levels, however, results in little difference in the overall pass rates between the two groups (44% for Native American students vs. 46% for their classmates).

Comparing the pass rates of the two groups in 1978-79 reveals a large discrepancy between the two groups. While the overall pass rate continued to improve significantly for the non-Native program participants (going from 46% to 65%), it noticeably dropped for the Native American students (from 44% to only 26%). The breakdown (Table 3 in Appendix C) shows that Native American students received lower grades than their classmates in each of the three levels, with only 1 out of 10 passing Arithmetic, 6 out of 24 passing Introductory Algebra and half (4 out of 8) passing Intermediate Algebra. It should be noted (see Tables 2 and 3 in Appendix C) that the large jump in pass rate in the program as a whole occurred in the Intermediate Algebra

level which became Math 100 and was offered for credit. It should also be pointed out that there was a larger proportion of Native American students enrolled in the non-credit levels of the program and that during this particular year (1978-79) there were no special support services (e.g., orientation or tutoring) available for Native American students through federal grants such as that provided the previous year by the Indian Careers in Health Program.

The overall pass rate remained stable (about 66%) for non-Native students in 1979-80 but noticeably increased in each of the three levels for Native American students (see Table 4 in Appendix C), improving the overall pass rate from 26% the previous year to 41% (see Figure 2). There were few structural changes in the Basic Skills Math Program itself; through the funding of a new Special Services grant, however, more support services were offered to qualified students. Since nearly all of the Native American students satisfied eligibility requirements for Special Services, many of them utilized tutoring and counseling services.

Again in 1980-81, there was little change in the overall pass rate (about 64%) for non-Native program participants, but there were some changes for the Native American participants whose overall performance improved from a pass rate of 41% to one of 48% (Table 5 in Appendix C shows the comparisons by level). Special Services again offered support services for many Native American students in the remedial math program and the Special Services counselor established communication with Math 001/100 instructors to monitor progress during the quarter.

Figure 2 indicates that the overall 1981-82 pass rates for both groups remained stable from the previous year (about 47% for Native American participants and 64% for their peers). Table 6 in Appendix C shows the breakdowns

by level. There were no major structural changes in the Basic Skills Math Program this year; similarly, support activities continued to be offered through Special Services.

In summary, the recent trends in pass rates for Native American students, compared to other Basic Skills Math participants, indicate that both groups, especially Native Americans, improved dramatically from 1976-77 to 1977-78 when there were significant program changes and specialized efforts to address the needs of Native American students (see Figure 2). The pass rate continued to improve (from 46% to 65%) for the non-Native students in 1978-79, particularly in the Intermediate Algebra level offered for credit, but dropped for the Native American participants who no longer received special support services. While there have been few changes in the overall pass rate (ranging from 64% to 66%) for non-Native students in the Math 001/100 program since 1978-79 (see Figure 2), there have been noticeable changes for the Native American students whose overall pass rate increased from 26% (1978-79) to 41% (1979-80) and again improved and stabilized at about 48% (1980-81) and 47% (1981-82). Thus, it appears that the support services offered to Native American students, in conjunction with the organizational improvements in the Basic Skills Math Program, have beneficial effects on successful completion which have helped narrow the performance gap between Native Americans and their peers.

V. SUMMARY AND CONCLUSIONS

The combination of declining secondary math performance and many institutions of higher education establishing math requirements while at the same time enrolling greater numbers of non-traditional students has resulted in escalating the number of students who are inadequately prepared to begin regular college math sequences required or recommended for their degree programs. Over the past ten years the University of Montana (UM) has

experienced about a 600 percent increase in the number of students taking "remedial" or basic skills mathematics. For a while such enrollment pressures and lack of additional resources resulted in most basic skills math students failing to successfully complete even the "remedial" work.

During the early part of this period, Native Americans, the largest non-traditional (ethnic minority) group at UM, were attempting to gain access to a variety of degree programs without much success due to their low completion rates in the "remedial" math (less than six percent of the Native Americans enrolled successfully passed basic skills math--Intermediate Algebra--in 1976-77). Over the past six years, changes have been made primarily in the organization and structure of the "remedial" program rather than in its content. An earlier study [2] showed that these structural changes resulted in dramatic improvements in successful "remedial" completion rates. In addition, students who completed the "remedial" instruction performed in subsequent math courses as well or better than did regular students (those without prior remedial work). Data from this same study, conducted at UM during the 1979-80 academic year, were available to determine how well Native American students performed in this same Basic Skills Mathematics Program.

Based upon the 1980 U.S. Census figures, Native Americans are under-represented at the University of Montana; however, over the past six years they have been over-represented in the Basic Skills Math (001/100) Program at the University. Analysis of the 1979-80 basic skills mathematics student population showed that, compared to their peers, Native American "remedial" students were more likely to have had fewer high school math courses and such courses tended to have been of lower level (e.g., general or consumer) math and taken less recently. In part these findings suggest that Native American basic skills students tend to come from high schools when/where math beyond the consumer level was not required and/or encouraged. Thus, Native Americans

who take basic skills math arrive at the University of Montana even less prepared in math than their peers in the same "remedial" courses.

Like their peers, Native American basic skills students in 1979-80 were most often Business Administration majors, followed by Undecided (General) and Arts and Sciences majors. The main differences in officially declared majors were that non-Natives were more often found in Forestry (7% vs. 3% of the Native Americans) and Native Americans were more likely to be in Social Sciences (18% vs. 8%) and Pharmacy (10% vs. 6% of non-Natives). Except for the fact that there were no Native Americans (vs. 2.0% of non-Natives) who reported being graduate students in "remedial" math, both groups tended to share similar profiles in regard to official class rank (over seventy percent were listed as freshmen). Also, both Native American basic skills students and their peers tended to be about equally divided into categories of male and female.

In addition to being older (less recently graduated from high school) and much more likely to be eligible for and require Special Services, Native American "remedial" math students were less likely to live on campus in dorms or to have a phone where they could be reached. Other things being equal, these latter factors may result in inconveniences (i.e. reduced accessibility to lab facilities and communication with lab assistants and course instructors) which could mitigate against successful completion of the Basic Skills Mathematics Program.

In regard to their college math experience, compared to other students, Native Americans tended to obtain lower placement scores, more often reported prior enrollment in "remedial" math programs, and showed a significantly higher percentage who began at the lower Math 001 (Arithmetic and Introductory Algebra levels). Consequently, only 27 percent of the Native Americans

(compared to two-thirds of the other basic skills students) were "currently" enrolled in Math 100 (Intermediate Algebra), the highest level "remedial" course. Native Americans, then, were less likely than their peers to plan on beginning their regular math sequence as their next course. Thus, even though the same percentage intended to take more math and most students planned on taking the Math 104-5-6 sequence--"Math for the Social Sciences," Native Americans were somewhat more likely than their peers to take the Math 107-8-9 sequence--"Math for the Biological Sciences" and more "remedial" Math 001/100 as their next math course.

Since Native American basic skills math students tended to begin at lower levels of instruction, they were also less likely than their "remedial" peers to take advanced math; however, analyses of data over time clearly show that the pass rates for both Native Americans and their peers who took Intermediate Algebra were significant improvements over those achieved in 1976-77 (prior to reorganization). Both Natives and non-Natives completing Intermediate Algebra tended to perform as well or better in their subsequent math courses than did regular students without prior basic skills math instruction. A previous study reported that these same "remedial" students also were much more likely than regular (non-remedial) students to pass their next (second) subsequent math course [2].

The results of this research also indicate that beyond the organizational or structural improvements in the Basic Skills Mathematics Program, special support services have had a noticeable positive impact on the Native American student performance. This has resulted in not only improved completion (pass) rates in the basic skills math courses but later on, those Native Americans (along with their "remedial" math peers) performed on a par with students not taking or needing prior "remedial" work.

In short, Native American students tend to start their university experience with a significantly greater need for basic skills mathematics instruction. Over time, structural changes in the Basic Skills Math Program and Special Services support for Native American students resulted in dramatic improvements and stabilization in their performances in terms of their being able to successfully complete the basic skills mathematics instruction and to compete well with regular math students in subsequent math courses. Thus, provided with the necessary support services in conjunction with properly organized basic skills mathematics instruction, Native Americans, as well as other students with poor math preparation are achieving in subsequent "required" math courses on a level equal to that of "non-remedial" students and, consequently, are improving their access to university and degree programs which require mathematics.

APPENDICES

APPENDIX A

MATH 001/100 INFORMATION FORM

APPENDIX A

Math 001/100 Information Form

☐ Arithmetic — Winter Quarter 1980

☐ Introductory Algebra Section _____ — Placement Score _____

☐ Intermediate Algebra Section _____

NAME: _____ DATE: _____
Last First

LOCAL ADDRESS: _____ PHONE: _____

CLASS STANDING (circle one): Fresh. Soph. Jr. Sr. Grad Other_____

MAJOR: _____ MINOR: _____

Have you enrolled in MA 001/100 before?_____ If so, when?_____ Grade_____

Do you plan to take other courses in Mathematics?_____

Name courses: _____ (e.g., 104, 107, 121)

High School Attended: _____
School name City State Year grad.

High School Mathematics:

Year	Course (Gen. Math, Alg. I, Geom., etc.)	Grade
Fresh.		
Soph.		
Jr.		
Sr.		
College Voc. Tech.		

How long has it been since you last studied Mathematics? _____ years.

Other Information or Comments: (For example, why didn't you take more mathematics in high school?)

APPENDIX B

EXPLANATION OF CODING SHEET

EXPLANATION OF CODING SHEET

Column	
1	BLANK
2-5	ID number (0001-9999)
6	Sex: 0-male 1-female
7	Quarter: 1-Autumn 2-Winter 3-Spring
8-9	Year (e.g., 79)
10	Native American Student: 0-No 1-Yes
11	Course: 1-Arithmetic 2-Introductory Algebra 3-Intermediate Algebra
12	Section: 1-Arithmetic 2,3-Introductory Algebra 1,2,3,4,5-Intermediate Algebra
13	Special Services Student: 0-No 1-Yes
14	Address: 0-dorm 1-Missoula 2-non-Missoula
15	Phone number listed: 0-No 1-Yes
16	Class standing: 0-undergraduate/non-degree 1-Freshman 2-Sophomore 3-Junior 4-Senior 5-graduate student
17-18	Placement score: Regular (00-32)
19-20	Major: see Major Code List (00-55)
21	Enrolled before: 0-No 1-Yes
22	When? Quarter: 1-Autumn 2-Winter 3-Spring
23-24	When? Year: (e.g., 79)
25	Grade: 0-F 5-I 1-D 6-W 2-C 7-X 3-B 8-N 4-A 9-P
26	Plan to take other math courses? 0-No 1-Yes
27	BLANK
28-30	Course number (e.g., 104, 107, 121)
31-33	School name: see School Code List (Montana--001-150 Out-of-State--151-500 Out-of-U.S. --501-550)
34-36	BLANK

37-38	State: see State Code List (01-51)			
39-40	Year graduated (e.g., 79)			
41-46	High school math taken:	41-General/Consumer Math	0-No	1-Yes
		42-Algebra I	0-No	1-Yes
		43-Geometry	0-No	1-Yes
		44-Algebra II (Trig)	0-No	1-Yes
		45-Sr. Math (Calculus)	0-No	1-Yes
		46-Computer Math	0-No	1-Yes
47	BLANK			
48-50	Total number of years of high school math (e.g., 3.0 or 2.5)			
51	College math taken: number of classes (0-9)			
52	BLANK			
53	BLANK			
54-55	Number of years since math taken: (00-99)			
56-60	Second quarter follow-up			
61-63	Next quarter math course number (e.g., 104, 107, 121)			
64	Next quarter math course section number: (1-9)			
65	Next quarter math course letter grade:	0-F	5-I	
		1-D	6-W	
		2-C	7-X	
		3-B	8-N	
		4-A	9-P	
66	Official class rank:	0-undergraduate/non-degree		
		1-Freshman		
		2-Sophomore		
		3-Junior		
		4-Senior		
		5-graduate student		
67	BLANK			
68-69	Declared major: see Major Code List (00-55)			
70	BLANK			
71	Final grade in course:	0-F	5-I	
		1-D	6-W	
		2-C	7-X	
		3-B	8-N	
		4-A	9-P	

APPENDIX C

BREAKDOWN OF MATH 001/100 FINAL GRADES
Academic Years 1976-77 through 1981-82

TABLE C-1
1976-77

Math 001: Intermediate Algebra

	--	Pass	Fail	Incomplete
Native	35	2 (6%)	13 (37%)	20 (57%)
Non-Native	395	82 (21%)	155 (39%)	158 (40%)
TOTAL	430	84 (20%)	168 (39%)	178 (41%)

TABLE C-2
1977-78

		Pass	Fail	Incomplete
Math 001: Arithmetic				
Native	14	12 (86%)	1 (7%)	1 (7%)
Non-Native	37	16 (43%)	20 (54%)	1 (3%)
TOTAL	51	28 (55%)	21 (41%)	2 (4%)
Math 001: Introductory Algebra				
Native	31	7 (23%)	22 (71%)	2 (6%)
Non-Native	227	102 (45%)	119 (52%)	6 (3%)
TOTAL	258	109 (42%)	141 (55%)	8 (3%)
Math 001: Intermediate Algebra				
Native	16	9 (56%)	6 (38%)	1 (6%)
Non-Native	238	127 (53%)	101 (42%)	10 (4%)
TOTAL	254	136 (54%)	107 (42%)	11 (4%)
Unclassified				
Native	3	0	3	0
Non-Native	25	0	25	0
TOTAL	28	0	28	0
All Levels Combined				
Native	64	28 (44%)	32 (50%)	4 (6%)
Non-Native	527	245 (46%)	265 (50%)	17 (3%)
TOTAL	591	273 (46%)	297 (50%)	21 (4%)

TABLE C-3
1978-79

		Pass	Fail	Incomplete
Math 001: Arithmetic				
Native	10	1 (10%)	9 (90%)	0 (0%)
Non-Native	43	22 (51%)	20 (47%)	1 (2%)
TOTAL	53	23 (43%)	29 (55%)	1 (2%)
Math 001: Introductory Algebra				
Native	24	6 (25%)	18 (75%)	0 (0%)
Non-Native	224	94 (42%)	113 (50%)	17 (8%)
TOTAL	248	100 (40%)	131 (53%)	17 (7%)

Math 100: Intermediate Algebra		Pass	D	Fail	Incomplete
Native	8	4 (50%)	1 (13%)	3 (38%)	0 (0%)
Non-Native	489	372 (76%)	64 (13%)	50 (10%)	3 (1%)
TOTAL	497	376 (76%)	65 (13%)	53 (11%)	3 (1%)
Three Levels Combined					
Native	42	11 (26%)	1 (2%)	30 (71%)	0 (0%)
Non-Native	756	488 (65%)	64 (8%)	183 (24%)	21 (3%)
TOTAL	798	499 (63%)	65 (8%)	213 (27%)	21 (3%)

TABLE C-4
1979-80

		Pass	Fail	Incomplete
Math 001: Arithmetic				
Native	17	4 (24%)	13 (76%)	0 (0%)
Non-Native	49	35 (71%)	13 (27%)	1 (2%)
TOTAL	66	39 (59%)	26 (39%)	1 (2%)
Math 001: Introductory Algebra				
Native	33	10 (30%)	21 (64%)	2 (6%)
Non-Native	268	109 (41%)	136 (51%)	23 (9%)
TOTAL	301	119 (40%)	157 (52%)	25 (8%)

		Pass	D	Fail	Incomplete
Math 100: Intermediate Algebra					
Native	18	14 (78%)	0 (0%)	2 (11%)	2 (11%)
Non-Native	654	495 (76%)	58 (9%)	78 (12%)	23 (4%)
TOTAL	672	509 (76%)	58 (9%)	80 (12%)	25 (4%)
Three Levels Combined					
Native	68	28 (41%)	0 (0%)	36 (53%)	4 (6)
Non-Native	971	639 (66%)	58 (6%)	227 (23%)	47 (5%)
TOTAL	1039	667 (64%)	58 (6%)	263 (25%)	51 (5%)

TABLE C-5
1980-81

		Pass	Fail	Incomplete
Math 001: Arithmetic				
Native	9	4 (44%)	4 (44%)	1 (11%)
Non-Native	79	39 (49%)	32 (41%)	8 (10%)
TOTAL	88	43 (49%)	36 (41%)	9 (10%)
Math 001: Introductory Algebra				
Native	27	11 (41%)	16 (59%)	0 (0%)
Non-Native	308	170 (55%)	114 (37%)	24 (8%)
TOTALS	335	181 (54%)	130 (39%)	24 (7%)

Math 100: Intermediate Algebra		Pass	D	Fail	Incomplete
Native	27	15 (56%)	3 (11%)	7 (26%)	2 (7%)
Non-Native	743	517 (70%)	72 (10%)	129 (17%)	25 (3%)
TOTALS	770	532 (69%)	75 (10%)	136 (18%)	27 (4%)
Three Levels Combined					
Native	63	30 (48%)	3 (5%)	27 (43%)	3 (5%)
Non-Native	1130	726 (64%)	72 (6%)	275 (24%)	57 (5%)
TOTALS	1193	756 (63%)	75 (6%)	302 (25%)	60 (5%)

TABLE C-6
1981-82

		Pass	Fail	Incomplete
Math 001: Arithmetic				
Native	12	3 (25%)	8 (67%)	1 (8%)
Non-Native	80	39 (49%)	34 (43%)	7 (9%)
TOTALS	92	42 (46%)	42 (46%)	8 (9%)
Math 001: Introductory Algebra				
Native	33	15 (45%)	15 (45%)	3 (9%)
Non-Native	332	183 (55%)	129 (39%)	20 (6%)
TOTALS	365	198 (54%)	144 (39%)	23 (6%)

Math 100: Intermediate Algebra		Pass	D	Fail	Incomplete
Native	23	14 (61%)	2 (9%)	5 (22%)	2 (9%)
Non-Native	769	533 (69%)	64 (8%)	144 (19%)	28 (4%)
TOTALS	792	547 (69%)	66 (8%)	149 (19%)	30 (4%)
Three Levels Combined					
Native	68	32 (47%)	2 (3%)	28 (41%)	6 (9%)
Non-Native	1181	755 (64%)	64 (5%)	307 (26%)	55 (5%)
TOTALS	1249	787 (63%)	66 (5%)	335 (27%)	61 (5%)

REFERENCES

Brod, Mary Jean

[1] 1978 Native American Students and Their Classmates: Math 001 Program 1977-78 Report and Recommendations. Missoula, MT: University of Montana, Mathematics Department.

[2] 1981 Remedial Mathematics at the University of Montana: Technical Report No. 1. Missoula, MT: University of Montana, Department of Mathematical Sciences.

Brod, Rodney L.

[3] 1975 Native American Academic Achievement and Predictors of Grade Point Average: Technical Report No. 1. Black River Falls, WI: School District Joint No. 2.

[4] 1976a Predictors of Grade-Averaging Bias Among Teachers of Native American Students: Technical Report No. 2. Black River Falls, WI: School District Joint No. 2.

[5] 1976b "Major Sources of Native American Academic Underachievement: Evidence Against Current Sociological Assessments." Social Science Division, American Association for the Advancement of Science, Pacific Division, Missoula, MT.

[6] 1977 Predicting School Attendance of Native Americans and Their Classmates: Technical Report No. 3. Black River Falls, WI: School District Joint No. 2.

[7] 1978 Fort Belknap Educational Needs Assessment. Harlem, MT: Fort Belknap Community Council, Education Department.

[8] 1979a Fort Belknap Vocational Educational Needs Assessment. Harlem, MT: Fort Belknap Community Council, Education Department.

[9] 1979b Choctaw Education. Box Elder, MT: LPS & Associates.

Brod, Rodney L. and Mary Jean

[10] 1981 Educational Needs of the Colville Confederated Tribes. Box Elder, MT: LPS & Associates.

Brod, Rodney L. and John M. McQuiston

[11] 1981 The Status of Educational Attainment and Performance of Adult American Indians: Characteristics and Assessment. Philadelphia, MS: National Indian Management Service, Inc.

Carlson, Katherine A.

[12] 1981 Postsecondary Educational Needs of Washington Indians: An Assessment. Olympia, WA: State of Washington Council for Postsecondary Education.

Editor

[13] 1982 "Decline of Math Skills Worries Scientists." The Chronical of Higher Education, January 13, p. 10.

Mathematical Association of America

[14] 1981 "Report of the Committee on Improving Remediation Efforts in the Colleges," American Mathematical Monthly, Vol. 88, No. 3, March, pp. 230-233.

Szasz, Margaret Connell

[15] 1977 Education and the American Indian, 2nd. Edition, Albuquerque, NM: University of New Mexico Press.